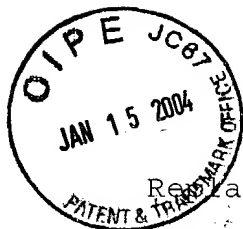


**Amendments to the Drawings**

The attached sheets of drawings include changes to Figures 1 and 2. These sheets, which include Figures 1 and 2, replace the original sheets including Figures 1 and 2. In Figure 1, previously omitted SEQ ID NOs have been added and the description of the abbreviations has been removed. In Figure 2, previously omitted SEQ ID NOs have been added.

Attachment: Replacement sheets

Annotated Sheets Showing Changes



Inventor: Sung  
Title: XYLANASES WITH ENHANCED  
THERMOPHILICITY AND ALKALOPHILICITY  
Serial No. 09/990,874  
Docket No. 07121.0003U1  
Sheet: 1 of 5  
Replacement Sheets

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JAN 22 2004

TC 1700

RECEIVED

Ca 23  
Cs 1

S AFNTQAAP 31  
G 1

FEB 06 2004

Tr2#		10	20	30	40	
Bp	1	RTITNNEMGN	HSGYDYELWK	DYGNT-SMTL	NNGGAFSAGW	N--NIGNA 45
Ca	32	KTITSNEIGV	NGGYDYELWK	DYGNT-SMTL	KNNGAFSCQW	S--NIGNA 76
Fs	1	NSSVTGNVG	SSPYHYEIWY	QGG-NNSMTF	YDNGTYKASW	N--GTNDF 44
Cs	2	RIIYDNETGT	HGGYDYELWK	DYGNT-IMEL	NDGGTFSCQW	S--NIGNA 46
Rf	1	SAADQQTRGN	VGGYDYEMWN	QNGQQQASMN	PGAGSFTCSW	S--NIENF 46
Tr2	1	QTIQPGTGY	NNGYFYSYWN	DGHGGVITYN	GPGGQFSVNW	S--NSGNF 45
Tv	1	QTIQPGTGF	NNGYFYSYWN	DGHGGVITYN	GPGGQFSVNW	S--NSGNF 45
Th	1	QTIGPGTGY	SNGYYYSYWN	DGHAGVITYN	GGGGSFTVNW	S--NSGNF 45
Sc	1	SGTPSSSTGT	DGGYYYSWWT	DGAGDATYQN	NGGGSYTLTW	SG--NNGNL 46
An	1		S AGINYVQNYN	GNLGDFTY-D	ESAGTFSMYW	EDGVSSDF 38
Ak	1		S AGINYVQNYN	GNLADFTY-D	ESAGTFSMYW	EDGVSSDF 38
AT	1		S AGINYVQNYN	QNLGDFTY-D	ESAGTFSMYW	EDGVSSDF 38
Tr1	1		ASINYDQNYQ	TGG-QVSY-	PSNTGFSVNW	N--TQDDF 34
Aa	1	RSTPSSTGE	NNGYYYSFWT	DGGGDVITYN	GNAGSYSVEW	S--NVGNF 45
Ss	1	ATTIT-NETGY	D-GMYYSFWT	DGGGSVSMTL	NGGGSYSTRW	T--NCGNF 45
SlB	1	DTVVTTNQEGT	NNGYYYSFWT	DSQGTVSMNM	GSGGQYSTSW	R--NTGNF 47
SlC	1	ATTITTNTGT	D-GMYYSFWT	DGGGSVSMTL	NGGGSYSTQW	T--NCGNF 46
Tl	1	QTTPNSEGW	HDGYYYSWWS	DGGAQATYTN	LEGGTYEISW	G--DGGNL 45
Tf	1	AVTSNETGY	HDGYFYSFWT	DAPGTVSMEL	GPGGNYSTSW	R--NTGNF 45
Bc	1		ASTDYWQNW	DGGGIVNAVN	GSGGNYSVNW	S--NTGNF 36
Bs	1		ASTDYWQNW	DGGGIVNAVN	GSGGNYSVNW	S--NTGNF 36

TECH CENTER 10/16/2000

FIGURE 1



# Replacement Sheet

Tr2#		50	60	70	80	
Bp	46	LFRK-GKKFD	ST-RTHHQLG	NISINYNASF	N-PSGNSYLC	VYGWTQSP 90
Ca	77	LFRK-GKKFN	DT-QTYKQLG	NISVNYNCNY	Q-PYGNSYLC	VYGWTSSP 121
FS	45	LARV-GFKYD	EK-HTYEELGP	IDAYYKWSKQ	GSAGGYNYIG	IYGWTVDP 91
Cs	47	LFRK-GRKFN	SD-KTYQELG	DIVVEYGCDY	N-PNGNSYLC	VYGWTRNF 91
Rf	47	LARM-GKNYD	SQKKNYKAFG	NIVLYDVEY	T-PRGNSYMC	VYGWTRNP 92
Tr2	46	VGGK-GWQPG	TKNKV-----	---INFS-GS	YNPNNGNSYLS	VYGWSRNP 83
Tv	46	VGGK-GWQPG	TKNKV-----	---INFS-GS	YNPNNGNSYLS	VYGWSRNP 83
Th	46	VGGK-GWQPG	TKNKV-----	---INFS-GS	YNPNNGNSYLS	IYGWSRNP 83
Sc	47	VGGK-GWNP	AASRS-----	---ISYS-GT	YQPNGNSYLS	VYGWTRSS 84
An	39	VVGL-GWTTG	SSNA-----	---ITYSAEY	SASGSSSYLA	VYGWVNYP 76
Ak	39	VVGL-GWTTG	SSNA-----	---ITYSAEY	SASGSSSYLA	VYGWVNYP 76
At	39	VVGLGGWTTG	SSNA-----	---ITYSAEY	SASGSASYLA	VYGWVNYP 77
Tr1	35	VVGV-GWTTG	SSAP-----	---INFGGSF	SVNSGTGLLS	VYGWSTNP 72
Aa	46	VGGK-GWNP	SAKD-----	---ITYSGNF	T-PSGNGYLS	VYGWTTDP 83
Ss	46	VAGK-GWANG	GR-RT-----	---VRYT-GW	FNPSPNGGYGC	LYGWTSNP 82
SlB	48	VAGK-GWANG	GR-RT-----	---VQYS-GS	FNPSPGNAYLA	LYGWTSNP 84
SlC	47	VAGK-GWSTG	DGN-----	---VRYN-GY	FNPVGNNGYGC	LYGWTSNP 82
Tl	46	VGGK-GWNP	LNARA-----	---IHFE-GV	YQPNGNSYLA	VYGWTRNP 83
Tf	46	VAGK-GWATG	GR-RT-----	---VTYS-AS	FNPSPGNAYLT	LYGWTRNP 82
Bc	37	VVGK-GWTTG	SPFRT-----	---INYNAGV	WAPNGNGYLT	LYGWTRSP 75
Bs	37	VVGK-GWTTG	SPFRT-----	---INYNAGV	WAPNGNGYLT	LYGWTRSP 75

Tr2#		90	100	110	120	130
Bp	91	LAEYYIVDSW	GTYR-PT--G	AYKGSFYADG	GTYDIYETTR	VNQPSSIIG 135
Ca	122	LVEYYIVDSW	GSWRPP--GG	TSKGTITVDG	GIYDIYETTR	INQPSSIIG 167
FS	92	LVEYYIVDDW	FNKPGANLLG	QRKGFTVDG	DTYBIWQNT	VQQPSIIG 139
Cs	92	LVEYYIVESW	GSWRPP--GA	TPKGTITQWMA	GTYEIYETTR	VNQPSSIDG 138
Rf	93	LMEYYIVEGW	GDWRPPGNDG	EVKGTVSANG	NTYDIRKTM	YNQPSLDG 140
Tr2	84	LIEYYIVENF	GTYN-PSTGA	TKLGEVTS	SVYDIYRTOR	VNQPSSIIG 130
Tv	84	LIEYYIVENF	GTYN-PSTGA	TKLGEVTS	SVYDIYRTOR	VNQPSSIIG 130
Th	84	LIEYYIVENF	GTYN-PSTGA	TKLGEVTS	SVYDIYRTOR	VNQPSSIIG 130
Sc	85	LIEYYIVESY	GSYD-PSSAA	SHKGSVTCNG	ATYDILSTWR	YNAPSIDG 131
An	77	GAEYYIVEDY	GDYN-PCSSA	TSLGTVYSDG	STYQVCTDTR	INEPSITG 123
Ak	77	QAEYYIVEDY	GDYN-PCSSA	TSLGTVYSDG	STYQVCTDTR	TNEPSITG 123
At	78	QAEYYIVEDY	GDYN-PCSSA	TSLGTVYSDG	STYQVCTDTR	INEPSITG 124
Tr1	73	LVEYYIMEDN	HNY--PAQ-G	TVKGTVTS	ATYTIWENTR	VNEPSIIG 117
Aa	84	LIEYYIVESY	GDYN-PGSGG	TTRGNVSSDG	SVYDIYTATR	TNAPSIDG 130
Ss	83	LVEYYIVDNW	GSYR-PT--G	ETRGTVHSDG	GTYDIYKTTR	YNAPSVEA 127
SlB	85	LVEYYIVDNW	GTYR-PT--G	EYKGTVTS	GTYDIYKTTR	VNKPSVEG 129
SlC	83	LVEYYIVDNW	GSYR-PT--G	TYKGTVSSDG	GTYDIYQTTR	YNAPSVEG 127
Tl	84	LVEYYIVENF	GTYD-PSSGA	TDLGTVECDG	SIYRLGKTTR	VNAPSIDG 130
Tf	83	LVEYYIVESW	GTYR-PT--G	TYMGTVTTDG	GTYDIYKTTR	YNAPSIEG 127
Bc	76	LIEYYVDSW	GTYR-PT--G	TYKGTVKSDG	GTYDIYTTTR	YNAPSIDG 120
Bs	76	LIEYYVDSW	GTYR-PT--G	TYKGTVKSDG	GTYDIYTTTR	YNAPSIDG 120

FIGURE 1 CONT'D

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# Replacement Sheet

Tr2#		140	150	160	
Bp	136	-IATFKQYWS VRQTKRTS--	-----GTVS	VSAHFRKWES	LGMPM-GK 174
Ca	168	-NTTEFKQYWS VRRTKRTS--	-----GTIS	VSKHFAAWES	KGMPL-GK 206
Fs	140	-TQTFPQYFS VRKSARSC--	-----GHID	ITAHMKKWEE	LGMKM-GK 178
Cs	139	-TATFPQYWS VRTSKRTS--	-----GTIS	VTEHFKQWER	MGMRM-GK 177
Rf	141	-TATFPQYWS VRQTSQSANN	QTNMKG	GTID VSKHFAAWES	AGLDMSGT 187
Tr2	131	-TATFYQYWS VRRNHR-S-S	-----GSVN	TANHFNAAWQ	QGLTL-GT 168
Tv	131	-TATFYQYWS VRRTHR-S-S	-----GSVN	TANHFNAAWQ	QGLTL-GT 168
Th	131	-TATFYQYWS VRRNHR-S-S	-----GSVN	TANHFNAAWAS	HGLTL-GT 168
Sc	132	-TQTFEQFWS VRNPKKAPGG	SIS---GTVD	VQCHFDAWK	LGMNLGSE 175
An	124	-TSTFTQYFS VRESTRTS--	-----GTVT	VANHFNFWAQ	HGFGN-SD 162
Ak	124	-TSTFTQYFS VRESTRTS--	-----GTVT	VANHFNFWAQ	HGFGN-SD 162
At	125	-TSTFTQYFS VRESTRTS--	-----GTVT	VANHFNFWAH	HGFHN-SD 163
Tr1	118	-TATFNQYIS VRNSPR-T-S	-----GTVT	VQNHFN-WAS	LGLHLGQM 155
Aa	131	-TQTFQYWS VRQNK-R-VG-	-----GTVT	TSNHFNAAWAK	LGMNL-GT 168
Ss	128	-PAAFDQYWS VRQSKVT--S	-----GTIT	TGNHFDWAR	AGMNMGNF 168
SlB	130	TR-TFDQYWS VRQSKR-TG-	-----GTIT	TGNHFDWAR	AGMPLGNF 168
SlC	128	TK-TFQYWS VRQSKVTSGS	-----GTIT	TGNHFDWAR	AGMNMGGF 168
Tl	131	TQ-TFDQYWS VRQDKR-T-S	-----GTVQ	TGCHFDWAR	AGLNVNGD 169
Tf	128	TR-TFDQYWS VRQSKRTS--	-----GTIT	AGNHFDWAR	HGMHLGTH 166
Bc	121	DRTTFTQYWS VRQSKRPTGS	N-----ATIT	FTNHVNAWKS	HGMNLGSN 163
Bs	121	DRTTFTQYWS VRQSKRPTGS	N-----ATIT	FSNHVNAWKS	HGMNLGSN 163

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Tr2#		170	180	190	
Bp	175	MYETAFTVEG YQSSGSANVM	TNQLFIGN	201	SEQ ID NO:4
Ca	207	MHETAFNIEG YQSSGKADV	N SMSINIGK	233	SEQ ID NO:6
Fs	179	MYEAKVLVEA GGGSGSFDV-	TYFKMT	203	SEQ ID NO:18
Cs	178	MYEVALTVEG YQSSGYANVY	KNEIRIGANP....		SEQ ID NO:7
Rf	188	LYEVSLNIEG YRSNGSANVK	SVSV	211	SEQ ID NO:8
Tr2	169	MDYQIVAVEG YFSSGSASI-	TVS	190	SEQ ID NO:16
Tv	169	MDYQIVAVEG YFSSGSASI-	TVS	190	SEQ ID NO:17
Th	169	MDYQIVAVEG YFSSGSASI-	TVS	190	SEQ ID NO:14
Sc	176	HNYQIVATEG YQSSGTATI-	TVT	197	SEQ ID NO:9
An	163	FNYQVMAVEA WSGAGSASV-	TISS	184	SEQ ID NO:1
Ak	163	FNYQVMAVEA WSGAGSASV-	TISS	184	SEQ ID NO:54
At	164	FNYQVVAVEA WSGAGSAV-	TISS	185	SEQ ID NO:2
Tr1	157	MNYQVVAVEG WGGSGSASQ-	SVSN	178	SEQ ID NO:15
Aa	169	HNYQILATEG YQSSGSSSI-	TIQ	190	SEQ ID NO:19
Ss	167	RYYMINATEG YQSSGSSTI-	TVSG	189	SEQ ID NO:12
SlB	169	SYMINATEG YQSSGTSSI-	NVGG.....		SEQ ID NO:10
SlC	169	RYYMINATEG YQSSGSSNI-	TVSG	191	SEQ ID NO:11
Tl	170	HYYQIVATEG YFSSGYARI-	TVADV	194	SEQ ID NO:20
Tf	167	D-YMIMATEG YQSSGSSNVT	LGTS.....		SEQ ID NO:13
Bc	164	WAYQVMATEG YQSSGSSNV-	TVW	185	SEQ ID NO:3
Bs	164	WAYQVMATEG YQSSGSSNV-	TVW	185	SEQ ID NO:5

FIGURE 1 CONT'D

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Replacement Sheet

TECH CENTER 1600/2300

5' -CT AGC TAA GGA GG CTG CAG ATG  
G ATT CCT CC GAC GTC TAC  
NheI | PstI

TrX-1  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16  
Q T I Q P G T G Y N N G Y F Y S  
CAA ACA ATA CAA CCA GGA ACC GGT TAC AAC AAC GGT TAC TTT TAC AGC  
GTT TGT TAT GTT GGT CCT TGG CCA ATG TTG TTG CCA ATG AAA ATG TCG  
TrX-8 AgeI

XyTv-2  
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32  
Y W N D G H G G V T Y T N G P G  
TAT TGG AAC GAT GGC CAT GGT GGT GTT ACC TAT ACA AAC GGG CCC GGA  
ATA ACC TTG CTA CCG GTA CCA CCA CAA TGG ATA TGT TTG CCC GGG CCT  
NcoI XyTv-7 ApaI

33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48  
G Q F S V N W S N S G N F V G G  
GGC CAA TTT AGC GTC AAT TGG TCT AAC TCC GGA AAC TTC GTA GGT GGA  
CCG GTT AAA TCG CAG TTA ACC AGA TTG AGG CCT TTG AAG CAT CCA CCT  
MunI BspEI

TrX-3  
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64  
K G W Q P G T K N K V I N F S G  
AAA GGT TGG CAA CCC GGG ACC AAA AAT AAG GTG ATC AAC TTC TCT GGA  
TTT CCA ACC GTT GGG CCC TGG TTT TTA TTC CAC TAG TTG AAG AGA CCT  
XmaI TrX-6

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
S Y N P N G N S Y L S V Y G W S  
TCT TAT AAT CCG AAT GGG AAT TCA TAC TTA AGC GTC TAT GGC TGG TCT  
AGA ATA TTA GGC TTA CCC TTA AGT ATG AAT TCG CAG ATA CCG ACC AGA  
EcoRI AflII

XyTv-4  
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95  
R N P L I E Y Y I V E N F G T  
AGA AAC CCA CTG ATT GAA TAT TAC ATT GTC GAA AAT TTC GGT AC  
TCT TTG GGT GAC TAA CTT ATA ATG TAA CAG CTT TTA AAG C  
Xba I XyTv-5 KpnI

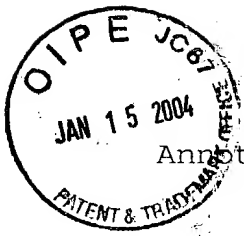
FIGURE 2



## Replacement Sheet

XyTv-101															
92	93	94	95	96	97	98	99	100	101	102	103	104	105		
V	D	N	F	G	T	Y	N	P	S	T	G	A	T	K	L
TC	GAC	AAT	TTC	GGT	ACC	TAC	AAT	CCG	AGT	ACC	GGC	GCC	ACA	AAA	TTA
3'-G	TTA	AAG	CCA	TGG	ATG	TTA	GGC	TCA	TGG	CCG	CGG	TGT	TTT	AAT	
SalI				KpnI				XyTv-110				KasI/NarI			
XyTv-102															
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121
G	E	V	T	S	D	G	S	V	Y	D	I	Y	R	T	Q
GGC	GAA	GTC	ACT	AGT	GAT	GGA	TCC	GTA	TAT	GAT	ATC	TAC	CGT	ACC	CAA
CCG	CTT	CAG	TGA	TCA	CTA	CCT	AGG	CAT	ATA	CTA	TAG	ATG	GCA	TGG	GTT
				SpeI				BamHI							
TrX-103															
122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137
R	V	N	Q	P	S	I	I	G	T	A	T	F	Y	Q	Y
CGC	GTT	AAT	CAG	CCA	TCG	ATC	ATT	GGA	ACC	GCC	ACC	TTT	TAT	CAG	TAC
GCG	CAA	TTA	GTC	GGT	AGC	TAG	TAA	CCT	TGG	CGG	TGG	AAA	ATA	GTC	ATG
MluI				ClaI											
TrX-108															
138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153
W	S	V	R	R	N	H	R	S	S	G	S	V	N	T	A
TGG	AGT	GTT	AGA	CGT	AAT	CAT	CGG	AGC	TCC	GGT	TCG	GTT	AAT	ACT	GCG
ACC	TCA	CAA	TCT	GCA	TTA	GTA	GCC	TCG	AGG	CCA	AGC	CAA	TTA	TGA	CGC
								SacI							
XyTv-104															
154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169
N	H	F	N	A	W	A	Q	Q	G	L	T	L	G	T	M
AAT	CAC	TTT	AAT	GCA	TGG	GCA	CAG	CAA	GGG	TTA	ACC	CTA	GGT	ACA	ATG
TTA	GTG	AAA	TTA	CGT	ACC	CGT	GTC	GTT	CCC	AAT	TGG	GAT	CCA	TGT	TAC
				NsiI				XyTv-107				AvrII			
XyTv-105															
170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185
D	Y	Q	I	V	A	V	E	G	Y	F	S	S	G	S	A
GAT	TAT	CAA	ATC	GTA	GCG	GTG	GAA	GGC	TAC	TTC	TCG	AGT	GGT	TCC	GCT
CTA	ATA	GTT	TAG	CAT	CGC	CAC	CTT	CCG	ATG	AAG	AGC	TCA	CCA	AGG	CGA
								XyTv-106				XhoI			
XyTv-106															
186	187	188	189	190											
S	I	T	V	S											
AGT	ATT	ACA	GTG	AGC	TAA	A									
TCA	TAA	TGT	CAC	TCG	ATT	TCT	AG-5'								
				BqlII											

FIGURE 2 CONT'D



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Annotated Sheet Showing Changes

Ca 23 S AFNTQAAP 31  
Cs 1 G 1

Tr2#		10	20	30	40	
Bp	1	RTITNNEMGN	HSGYDYELWK	DYGNT-SMTL	NNGGAFSAGW	N--NIGNA 45
Ca	32	KTITSNEIGV	NGGYDYELWK	DYGNT-SMTL	KNNGAFSCQW	S--NIGNA 76
Fs	1	NSSVTGNVG	SSPYHYEIWY	QGG-NNSMTF	YDNGTYKASW	N--GTNDF 44
Cs	2	RIIYDNETGT	HGGYDYELWK	DYGNT-IMEL	NDGGTFSCQW	S--NIGNA 46
Rf	1	SAADQQTRGN	VGGYDYEMWN	QNGCQASMN	PGAGSFTCSW	S--NIENF 46
Tr2	1	QTIQPGTGY	NNGYFYSYWN	DGHGGVITYN	GPGGQFSVNW	S--NSGNF 45
Tv	1	QTIQPGTGF	NNGYFYSYWN	DGHGGVITYN	GPGGQFSVNW	S--NSGNF 45
Th	1	QTIGPGTGY	SNGYYSYWN	DGHAGVITYN	GGGGSFTVNW	S--NSGNF 45
Sc	1	SGTPSSTGT	DGGYYSWWT	DGAGDATYQN	NGGGSYTLTW	SG--NNGNL 46
An	1	S	AGINYVQNYN	GNLGDFTY-D	ESAGTFSMYW	EDGVSSDF 38
Ak	1	S	AGINYVQNYN	GNLADFTY-D	ESAGTFSMYW	EDGVSSDF 38
AT	1	S	AGINYVQNYN	QNLGDFTY-D	ESAGTFSMYW	EDGVSSDF 38
Tr1	1		ASINYDQNYQ	TGG-QVSYS-	PSNTGFSVNW	N--TQDDF 34
Aa	1	RSTPSSTGE	NNGYYSFWT	DGGGDVITYN	GNAGSYSVEW	S--NVGNF 45
Ss	1	ATTIT-NETGY	D-GMYYSFWT	DGGGSVSMTL	NGGGSYSTRW	T--NCGNF 45
SlB	1	DTVVTTNQEGT	NNGYYSFWT	DSQGTVSMNM	GSGGQYSTSW	R--NTGNF 47
SlC	1	ATTITTNTGT	D-GMYYSFWT	DGGGSVSMTL	NGGGSYSTQW	T--NCGNF 46
Tl	1	QTTPNSEGW	HDGYYSWWS	DGGAQATYTN	LEGGTYEISW	G--DGGNL 45
Tf	1	AVTSNETGY	HDGYYSFWT	DAPGTVSMEL	GPGGNYSTSW	R--NTGNF 45
Bc	1		ASTDYWQNWT	DGGGIVNAVN	GSGGNYSVNW	S--NTGNF 36
Bs	1		ASTDYWQNWT	DGGGIVNAVN	GSGGNYSVNW	S--NTGNF 36

FIGURE 1



# Annotated Sheet Showing Changes

Tr2#		50		60		70		80	
Bp	46	LFRK- <u>G</u> KKFD	ST-RTHHQLG	NISINYNASF	N- <u>P</u> SGNSYLC	<u>V</u> YGWTQSP	90		
Ca	77	LFRK- <u>G</u> KKFN	DT-QTYKQLG	NISVNYNLCNY	Q- <u>P</u> YGNSYLC	<u>V</u> YGWTSSP	121		
FS	45	LARV- <u>G</u> FKYD	EK-HTYEELGP	IDAYYKWSKQ	GSAGGYNYIG	<u>I</u> YGWTVDP	91		
Cs	47	LFRK- <u>G</u> RKFN	SD-KTYQELG	DIVVEYGCDY	N- <u>P</u> NGNSYLC	<u>V</u> YGWTRNF	91		
Rf	47	LARM- <u>G</u> KNYD	SQKKNYKAFG	NIVLTYDVEY	T- <u>P</u> RGNSYMC	<u>V</u> YGWTRNP	92		
Tr2	46	VGGK- <u>G</u> WQPG	TKNKV-----	---INFS-GS	YNPNNGNSYLS	<u>V</u> YGWSRNP	83		
Tv	46	VGGK- <u>G</u> WQPG	TKNKV-----	---INFS-GS	YNPNNGNSYLS	<u>V</u> YGWSRNP	83		
Th	46	VGGK- <u>G</u> WQPG	TKNKV-----	---INFS-GS	YNPNNGNSYLS	<u>I</u> YGWSRNP	83		
Sc	47	VGGK- <u>G</u> WNPG	AASRS-----	---ISYS-GT	YQPNNGNSYLS	<u>V</u> YGWTRSS	84		
An	39	VVGL- <u>G</u> WTTG	SSNA-----	---ITYSAEY	SASGSSSYLA	<u>V</u> YGWVNYP	77	76	
Ak	39	VVGL- <u>G</u> WTTG	SSNA-----	---ITYSAEY	SASGSSSYLA	<u>V</u> YGWVNYP	77	76	
At	39	VVGL <u>G</u> WTTG	SSNA-----	---ITYSAEY	SASGSASYLA	<u>V</u> YGWVNYP	77		
Tr1	35	VVGV- <u>G</u> WTTG	SSAP-----	---INFGGSF	SVNSGTGLLS	<u>V</u> YGWSTNP	72		
Aa	46	VGGK- <u>G</u> WNPG	SAKD-----	---ITYSGNF	T- <u>P</u> SGNGYLS	<u>V</u> YGWTTDP	83		
Ss	46	VAGK- <u>G</u> WANG	GR-RT-----	---VRYT-GW	FNPSGNGYGC	<u>L</u> YGWTSNP	82		
SlB	48	VAGK- <u>G</u> WANG	GR-RT-----	---VQYS-GS	FNPSGNAYLA	<u>L</u> YGWTSNP	84		
SlC	47	VAGK- <u>G</u> WSTG	DGN-----	---VRYN-GY	FNPPVNGYGC	<u>L</u> YGWTSNP	82		
Tl	46	VGGK- <u>G</u> WNPG	LNARA-----	---IHFE-GV	YQPNNGNSYLA	<u>V</u> YGWTRNP	83		
Tf	46	VAGK- <u>G</u> WATG	GR-RT-----	---VTYS-AS	FNPSGNAYLT	<u>L</u> YGWTRNP	82		
Bc	37	VVGK- <u>G</u> WTTG	SPFRT-----	---INYNAGV	WAPNGNGYLT	<u>L</u> YGWTRSP	75		
Bs	37	VVGK- <u>G</u> WTTG	SPFRT-----	---INYNAGV	WAPNGNGYLT	<u>L</u> YGWTRSP	75		

Tr2#		90		100		110		120		130	
Bp	91	LA <u>E</u> YYIVDSW	GT <u>Y</u> R-PT--G	AYKGSFYADG	GT <u>Y</u> DIYETTR	VN <u>Q</u> PSIIG	135				
Ca	122	LVE <u>E</u> YYIVDSW	GSWRPP--GG	TSKGTITVDG	GI <u>Y</u> DIYETTR	IN <u>Q</u> PSIQG	167				
Fs	92	LVE <u>E</u> YYIVDDW	FNKPGANLLG	QRAGEFTVDG	DT <u>Y</u> EIWQNTR	VQ <u>Q</u> PSIKG	139				
Cs	92	LME <u>E</u> YYIVESW	GSWRPP--GA	TPKGTITQWMAGT	<u>Y</u> EIYETTR	VN <u>Q</u> PSIDG	138				
Rf	93	LME <u>E</u> YYIVEGW	GDWRPPGNDG	EVKGTVSANG	NT <u>Y</u> DIRKTMR	YN <u>Q</u> PSLDG	140				
Tr2	84	LI <u>E</u> YYIIVENF	GT <u>Y</u> N-PSTGA	TKLGEVTSDG	SV <u>Y</u> DIYRTQR	VN <u>Q</u> PSIIG	130				
Tv	84	LI <u>E</u> YYIIVENF	GT <u>Y</u> N-PSTGA	TKLGEVTSDG	SV <u>Y</u> DIYRTQR	VN <u>Q</u> PSIIG	130				
Th	84	LI <u>E</u> YYIIVENF	GT <u>Y</u> N-PSTGA	TKLGEVTSDG	SV <u>Y</u> DIYRTQR	VN <u>Q</u> PSIIG	130				
Sc	85	LI <u>E</u> YYIIVESY	GSYD-PSSAA	SHKGSVTCNG	AT <u>Y</u> DILSTWR	YN <u>A</u> PSIDG	131				
An	77	GA <u>E</u> YYIVEDY	GDYN-PCSSA	TSLGTVYSDG	ST <u>Y</u> QVCTDTR	INE <u>P</u> SITG	124	123			
Ak	77	QA <u>E</u> YYIVEDY	GDYN-PCSSA	TSLGTVYSDG	ST <u>Y</u> QVCTDTR	TNE <u>P</u> SITG	124	123			
At	78	QA <u>E</u> YYIVEDY	GDYN-PCSSA	TSLGTVYSDG	ST <u>Y</u> QVCTDTR	INE <u>P</u> SITG	124				
Tr1	73	LVE <u>E</u> YYIMEDN	HNY--PAQ-G	TVKGTVTSDG	AT <u>Y</u> TIWENTR	VNE <u>P</u> SIQG	117				
Aa	84	LI <u>E</u> YYIIVESY	GDYN-PGSGG	TTRGNVSSDG	SV <u>Y</u> DIYTATR	TN <u>A</u> PSIDG	130				
Ss	83	LVE <u>E</u> YYIVDNW	GSYR-PT--G	ETRGTVHSDG	GT <u>Y</u> DIYKTTR	YN <u>A</u> PSVEA	127				
SlB	85	LVE <u>E</u> YYIVDNW	GT <u>Y</u> R-PT--G	EYKGTVTSDG	GT <u>Y</u> DIYKTTR	VN <u>K</u> PSVEG	129				
SlC	83	LVE <u>E</u> YYIVDNW	GSYR-PT--G	TYKGTVSSDG	GT <u>Y</u> DIYQTTR	YN <u>A</u> PSVEG	127				
Tl	84	LVE <u>E</u> YYIIVENF	GT <u>Y</u> D-PSSGA	TDLGTVECDG	SI <u>Y</u> RLGKTTR	VN <u>A</u> PSIDG	130				
Tf	83	LVE <u>E</u> YYIVESW	GT <u>Y</u> R-PT--G	TYMGTVTTDG	GT <u>Y</u> DIYKTTR	YN <u>A</u> PSIEG	127				
Bc	76	LI <u>E</u> YYVVDSW	GT <u>Y</u> R-PT--G	TYKGTVKSDG	GT <u>Y</u> DIYTTTR	YN <u>A</u> PSIDG	120				
Bs	76	LI <u>E</u> YYVVDSW	GT <u>Y</u> R-PT--G	TYKGTVKSDG	GT <u>Y</u> DIYTTTR	YN <u>A</u> PSIDG	120				

FIGURE 1 CONT'D



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## Annotated Sheet Showing Changes

TECH CENTER 1600/2000

Tr2#		140	150	160	
Bp	136	-IATFKQYWS VRQTKRTS--	-----GTVS	VSAHFRKWES	LGMPM-GK 174
Ca	168	-NTTFKQYWS VRRTKRTS--	-----GTIS	VSKHFAAWES	KGMPL-GK 206
Fs	140	-TQTFQYFS VRKSARSC--	-----GHID	ITAHMKKWE	LGMMK-GK 178
Cs	139	-TATFQYWS VRTSKRTS--	-----GTIS	VTEHFKQWER	MGMRM-GK 177
Rf	141	-TATFQYWS VRQTS GSANN	QTN YMKGTID	VSKHFDWASA	AGLDMSGT 187
Tr2	131	-TATFYQYWS VRRNHR-S-S	-----GSVN	TANHFNAAQ	QGLTL-GT 168
Tv	131	-TATFYQYWS VRRTHR-S-S	-----GSVN	TANHFNAAQ	QGLTL-GT 168
Th	131	-TATFYQYWS VRRNHR-S-S	-----GSVN	TANHFNAAWAS	HGLTL-GT 168
Sc	132	-TQTFEQFWS VRNPKKAPGG	SIS--GTVD	VQCHFDWKG	LGMLGSE 175
An	124125	-TSTFTQYFS VRESTRTS--	-----GTVT	VANHFNFWAQ	HGFGN-SD 162
Ak	124125	-TSTFTQYFS VRESTRTS--	-----GTVT	VANHFNFWAQ	HGFGN-SD 162
At	125	-TSTFTQYFS VRESTRTS--	-----GTVT	VANHFNFWAH	HGFHN-SD 163
Tr1	118	-TATFNQYIS VRNSPR-T-S	-----GTVT	VQNHFNWAS	LGLHLGQM 155
Aa	131	-TQTFQYWS VRQNK R-VG-	-----GTVT	TSNHFNAAWAK	LGMLN-GT 168
Ss	128	-PAAFDQYWS VRQSKVT-S	-----GTIT	TGNHFDWAR	AGMNMGNF 168
SlB	130	TR-TFDQYWS VRQSKR-TG-	-----GTIT	TGNHFDWAR	AGMPLGNF 168
SLC	128	TK-TFQYWS VRQSKVTSGS	-----GTIT	TGNHFDWAR	AGMNMGQF 168
Tl	131	TQ-TFDQYWS VRQDKR-T-S	-----GTVQ	TGCHFDWAR	AGLNVNGD 169
Tf	128	TR-TFDQYWS VRQSKRTS--	-----GTIT	AGNHFDWAR	HGMHLGTH 166
Bc	121	DRTTFTQYWS VRQSKRPTGS	N-----ATIT	FTNHVNAWKS	HGMNLGSN 163
Bs	121	DRTTFTQYWS VRQSKRPTGS	N-----ATIT	FSNHVNAWKS	HGMNLGSN 163

Tr2#		170	180	190	
Bp	175	MYETAFTVEG	YQSSGSANVM	TNQLFIGN	201 SEQ ID NO:4
Ca	207	MHETAFNIEG	YQSSGKADVN	SMSINIGK	233 SEQ ID NO:6
Fs	179	MYEAKVLVEA	GGGSGSFDV-	TYFKMT	203 SEQ ID NO:18
Cs	178	MYEVALTVEG	YQSSGYANVY	KNEIRIGANP....	SEQ ID NO:7
Rf	188	LYEVS LNIEG	YRSNGSANVK	SVSV	211 SEQ ID NO:8
Tr2	169	MDYQIVAVEG	YFSSGSASI-	TVS	190 SEQ ID NO:16
Tv	169	MDYQIVAVEG	YFSSGSASI-	TVS	190 SEQ ID NO:17
Th	169	MDYQIVAVEG	YFSSGSASI-	TVS	190 SEQ ID NO:14
Sc	176	HNYQIVATEG	YQSSGTATI-	TVT	197 SEQ ID NO:9
An	163164	FNYQVMAVEA	WSGAGSASV-	TISS	184 185 SEQ ID NO:1
Ak	163164	FNYQVMAVEA	WSGAGSASV-	TISS	184 185 SEQ ID NO:54
At	164	FNYQVVAVEA	WSGAGSAAV-	TISS	185 SEQ ID NO:2
Tr1	157	MNYQVVAVEG	WGGSGSASQ-	SVSN	178 SEQ ID NO:15
Aa	169	HNYQILATEG	YQSSGSSSI-	TIQ	190 SEQ ID NO:19
Ss	167	RYYMINATEG	YQSSGSSTI-	TVSG	189 SEQ ID NO:12
SlB	169	SYYMINATEG	YQSSGTSSI-	NVGG.....	SEQ ID NO:10
SLC	169	RYYMINATEG	YQSSGSSNI-	TVSG	191 SEQ ID NO:11
Tl	170	HYYQIVATEG	YFSSGYARI-	TVADV G	194 SEQ ID NO:20
Tf	167	D-YMIMATEG	YQSSGSSNVT	LGTS.....	SEQ ID NO:13
Bc	164	WAYQVMATEG	YQSSGSSNV-	TVW	185 SEQ ID NO:3
Bs	164	WAYQVMATEG	YQSSGSSNV-	TVW	185 SEQ ID NO:5

FIGURE 1 CONT'D

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TECH CENTER 1600/2900



Annotated Sheet Showing Changes

Bp — *Bacillus pumilus*  
Ca — *Clostridium acetobutylicum* P262 XynB  
Cs — *Clostridium stercorarium* xynA  
Rf — *Ruminococcus flavefaciens*  
Tr2 — *Trichoderma reesei* XYN-II  
Tv — *Trichoderma viride*  
Th — *Trichoderma harzianum*  
Sc — *Schizophyllum commune* Xylanase A  
An — *Aspergillus niger*, var. *awamori*  
Ak — *Aspergillus kawachii* XynC  
At — *Aspergillus tubigensis*  
Tr1 — *Trichoderma reesei* XYN-I  
Aa — *Aspergillus awamori* var. *kawachi* Xyn-B  
Fs — *Fibrobacter succinogenes* XYN-II  
Ss — *Streptomyces* sp. 36a  
SlB — *Streptomyces lividans* Xln-B  
SlC — *Streptomyces lividans* Xln-C  
Tl — *Thermomyces lanuginosus* Xyn —  
Tf — *Thermomonospora fusca* TfxA  
Be — *Bacillus circulans*  
Bs — *Bacillus subtilis*

FIGURE 1 CONT'D

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Annotated Sheet Showing Changes

TECH CENTER 1600/2000

5' -CT AGC TAA GGA GG CTG CAG ATG  
 G ATT CCT CC GAC GTC TAC  
 NheI | PstI

TrX-1  
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16  
 Q T I Q P G T G Y N N G Y F Y S  
 CAA ACA ATA CAA CCA GGA ACC GGT TAC AAC AAC GGT TAC TTT TAC AGC  
 GTT TGT TAT GTT GGT CCT TGG CCA ATG TTG TTG CCA ATG AAA ATG TCG  
 TrX-8 AgeI

XyTv-2  
 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32  
 Y W N D G H G G V T Y T N G P G  
 TAT TGG AAC GAT GGC CAT GGT GGT GTT ACC TAT ACA AAC GGG CCC GGA  
 ATA ACC TTG CTA CCG GTA CCA CCA CAA TGG ATA TGT TTG CCC GGG CCT  
 NcoI XyTv-7 ApaI

33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48  
 G Q F S V N W S N S G N F V G G  
 GGC CAA TTT AGC GTC AAT TGG TCT AAC TCC GGA AAC TTC GTA GGT GGA  
 CCG GTT AAA TCG CAG TTA ACC AGA TTG AGG CCT TTG AAG CAT CCA CCT  
 MuiI BspEI

TrX-3  
 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64  
 K G W Q P G T K N K V I N F S G  
 AAA GGT TGG CAA CCC GGG ACC AAA AAT AAG GTG ATC AAC TTC TCT GGA  
 TTT CCA ACC GTT GGG CCC TGG TTT TTA TTC CAC TAG TTG AAG AGA CCT  
 XmaI TrX-6

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
 S Y N P N G N S Y L S V Y G W S  
 TCT TAT AAT CCG AAT GGG AAT TCA TAC TTA AGC GTC TAT GGC TGG TCT  
 AGA ATA TTA GGC TTA CCC TTA AGT ATG AAT TCG CAG ATA CCG ACC AGA  
 EcoRI AflII

XyTv-4  
 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95  
 R N P L I E Y Y I V E N F G T  
 AGA AAC CCA CTG ATT GAA TAT TAC ATT GTC GAA AAT TTC GGT AC  
 TCT TTG GGT GAC TAA CTT ATA ATG TAA CAG CTT TTA AAG C  
 Xba I XyTv-5 KpnI

FIGURE 2 →

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TECH CENTER 1600/2500



## Annotated Sheet Showing Changes

XyTv-101															
	92	93	94	95	96	97	98	99	100	101	102	103	104	105	
V	D	N	F	G	T	Y	N	P	S	T	G	A	T	K	L
TC	GAC	AAT	TTC	GGT	ACC	TAC	AAT	CCG	AGT	ACC	GGC	GCC	ACA	AAA	TTA
3'-G	TTA	AAG	CCA	TGG	ATG	TTA	GGC	TCA	TGG	CCG	CGG	TGT	TTT	AAT	
SalI				KpnI				XyTv-110		KasI/NarI					

XyTv-102															
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121
G	E	V	T	S	D	G	S	V	Y	D	I	Y	R	T	Q
GGC	GAA	GTC	ACT	AGT	GAT	GGA	TCC	GTA	TAT	GAT	ATC	TAC	CGT	ACC	CAA
CCG	CTT	CAG	TGA	TCA	CTA	CCT	AGG	CAT	ATA	CTA	TAG	ATG	GCA	TGG	GTT
			SpeI			BamHI								XyTv-109	

TrX-103															
122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137
R	V	N	Q	P	S	I	I	G	T	A	T	F	Y	Q	Y
CGC	GTT	AAT	CAG	CCA	TCG	ATC	ATT	GGA	ACC	GCC	ACC	TTT	TAT	CAG	TAC
GCG	CAA	TTA	GTC	GGT	AGC	TAG	TAA	CCT	TGG	CGG	TGG	AAA	ATA	GTC	ATG
MluI					Clai										

TrX-108															
138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153
W	S	V	R	R	N	H	R	S	S	G	S	V	N	T	A
TGG	AGT	GTT	AGA	CGT	AAT	CAT	CGG	AGC	TCC	GGT	TCG	GTT	AAT	ACT	GCG
ACC	TCA	CAA	TCT	GCA	TTA	GTA	GCC	TCG	AGG	CCA	AGC	CAA	TTA	TGA	CGC
								SacI							

XyTv-104															
154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169
N	H	F	N	A	W	A	Q	Q	G	L	T	L	G	T	M
AAT	CAC	TTT	AAT	GCA	TGG	GCA	CAG	CAA	GGG	TTA	ACC	CTA	GGT	ACA	ATG
TTA	GTG	AAA	TTA	CGT	ACC	CGT	GTC	GTT	CCC	AAT	TGG	GAT	CCA	TGT	TAC
			NsiI					XyTv-107				AvrII			

XyTv-105															
170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185
D	Y	Q	I	V	A	V	E	G	Y	F	S	S	G	S	A
GAT	TAT	CAA	ATC	GTA	GCG	GTG	GAA	GGC	TAC	TTC	TCG	AGT	GGT	TCC	GCT
CTA	ATA	GTT	TAG	CAT	CGC	CAC	CTT	CCG	ATG	AAG	AGC	TCA	CCA	AGG	CGA
								XyTv-106			XhoI				

186	187	188	189	190											
S	I	T	V	S											
AGT	ATT	ACA	GTG	AGC	TAA	A									
TCA	TAA	TGT	CAC	TCG	ATT	TCT	AG-5'								
						BglII									

SEQ ID NO:16  
SEQ ID NO:39

FIGURE 2 CONT'D →